Spin-Resolved Fermi Surface Mapping at the Swiss Light Source

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Over the last years, a photoemission spectrometer with a full three-dimensional spin polarimeter has been built for the purpose of doing spin-resolved Fermi surface mapping experiments (M. Hoesch *et al*., J. Electron Spectrosc. **124**, 263 (2002)). It is now mounted at the Surface and Interface Spectroscopy (SIS) beamline of the Swiss Light Source (SLS). In this talk, the design of this instrument will be discussed as well as the range of opportunities that it provides. First experimental results, carried out with a laboratory photon source, include the confirmation of the spin assignments for majority and minority bands near the Fermi level in nickel metal as measured through the (111) surface. Ultrathin films of Ni on Cu(001) were studied as a function of film thickness. A rapid convergence to the bulk-like band structure is found for the *sp*-bands, a slower one for the more localized *d* bands. These observations are somewhat obscured by the thickness-dependent magnetic transition: for the thinnest films the Curie temperature drops below the measuring temperature and the films becomes paramagnetic. In the first experiments with synchrotron light from the SLS the spin polarisation as well as the detailed spin structure of the spin-orbit split Shockley surface state on Au(111) were studied. This challenging project of separating two bands that are split by ca. 150 meV in energy and 0.026 $Å^{-1}$ in momentum was successfully carried out, and in the process the first spin-resolved Fermi surface map could be recorded, confirming the free-electron like rotation of the spins along the Fermi surface.